_____

Automatic Irrigation System

Mr. Ashish Charbe
Department of Electronics & Telecomm. Engineering
Rajiv Gandhi College of Engineering & Research
Nagpur, India
ashishcharbe@gmail.com

Mr. Sagar Soitkar
Department of Electronics Engineering
Rajiv Gandhi College of Engineering & Research
Nagpur, India
sagar.soitkar@gmail.com

Abstract— Nowadays farmers are facing so many problems in their agriculture system. As they are used traditional equipments in their field and completely dependent on manpower required for daily work. They have to start the motor manually time to time for watering the crops. So the proposed system called automatic irrigation system where soil moisture sensors are used to sense the moisture level in the soil. To know the status of water level is less in soil, farmer will get alerted through the LCD display.

Keywords- *Microcontroller, soil sensor, motor driverIC293*

_____*****_____

I. INTRODUCTION

Irrigation is the method in which a controlled amount of water is supplied to plants at regular intervals for agriculture. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Additionally, irrigation also has a few other uses in crop production, which include protecting plants against frost, suppressing weed growth in grain fields, and preventing soil consolidation. In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dry land farming.

Irrigation systems are also used for dust suppression, disposal of sewage, and in mining. Irrigation is often studied together with drainage, which is the natural or artificial removal of surface and sub-surface water from a given area.

An automated irrigation system refers to the operation of the system with no or just minimum surveillance, almost every system can be automated with help of timers, sensors or computers or mechanical appliances.

It makes the irrigation process more efficient and workers can concentrate on other farming tasks.

II. SYSTEM DESIGN

Figure 1 shows the block diagram of proposed system. Here, ATMega 328 is used as a control device to monitor the present level of moisture and according to the status; the controller will take the decision to ON/OFF the motor pump.

The comprises of following major blocks:
1. Atmega328 microcontroller
2. Liquid crystal display
3. Motor driver IC
4. Soil moisture sensor
5. Switches
6. Water level sensor
7. DC motor

ATMEGA328 MICROCONTROLLER

ATMega328 is the ATMEL Microcontroller. This product let you to realize your small project without using a full size Arduino board. To make this microcontroller working with the Arduino IDE you need a 16 MHz crystal, a 5V power supply and a serial connection.

Features

1. 28-pin AVR Microcontroller
2. Flash Program Memory: 32 kbytes
3. EEPROM Data Memory: 1 kbytes
4. SRAM Data Memory: 2 kbytes
5. I/O Pins: 23
6. Timers: Two 8-bit / One 16-bit
7. A/D Converter: 10-bit Six Channel
8. PWM: Six Channels

MOTOR DRIVERS

Motor driver is using L293D Integrated IC. Two L293D motor drivers can control up to 4 DC motors or 2 stepper motors. Motor output connectors are at the right side of the board. Two DC motors can also be controlled by PWM or at full speed by two PWM selection jumpers.

➢ Put jumpers in 2-3 modes to avoid speed control and achieve maximum speed
➢ Put jumpers 1-2 for speed control through OC1A (PD5) and OC1B (PD4)
➢ If PWM is not used PD4 and PD5 can be used as normal I/O pins
➢ Motor1 can be controlled by PC0 and PC1
➢ Motor2 can be controlled by PC2 and PC3
➢ Motor3 can be controlled by PC4 and PC5
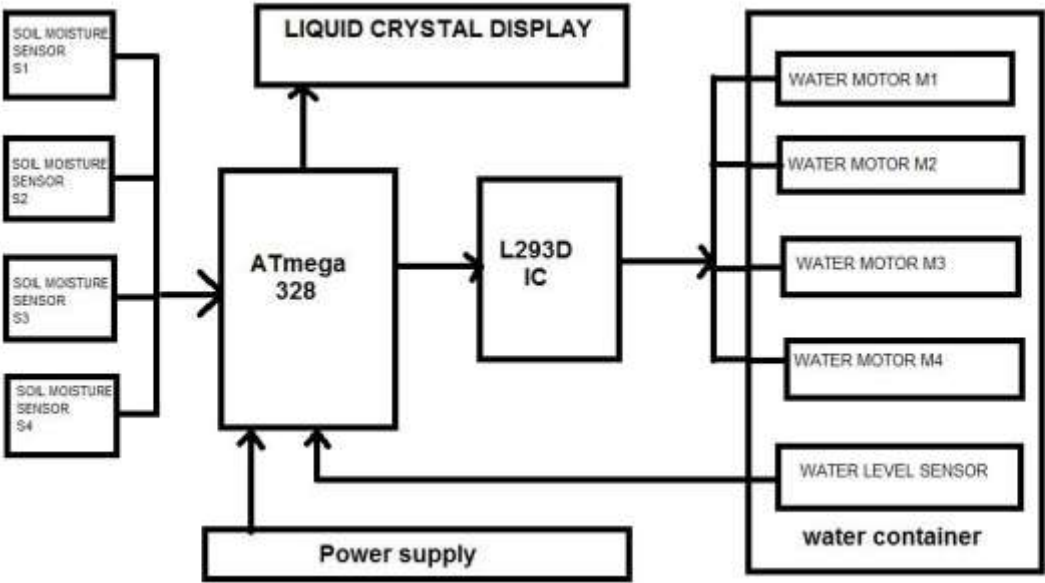➢ Motor4 can be controlled by PC6 and PC7

355

_____

Fig. 1 Automatic Irrigation System

MOTOR DRIVER IC

A motor driver IC is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver ICs act as an interface between microprocessors in robots and the motors in the robot. The most commonly used motor driver IC' s are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor.

NEED OF MOTOR DRIVER IC

Motor Driver ICs are primarily used in autonomous robotics only. Also most microprocessors operate at low voltages and require a small amount of current to operate while the motors require a relatively higher voltages and current. Thus current cannot be supplied to the motors from the microprocessor. This is the primary need for the motor driver IC.

Fig. 2 Pin Diagram of IC 293

Pin 1	Pin 2	Pin 7	Function
High	**High**	**Low**	**Turn Anti-clockwise (Reverse)**
High	**Low**	**High**	**Turn clockwise (Forward)**
High	**High**	**High**	**Stop**
High	**Low**	**Low**	**Stop**
Low	**X**	**X**	**Stop**

TABLE 1. STATUS OF MOTOR FOR DIFFERENT COFIGURATION
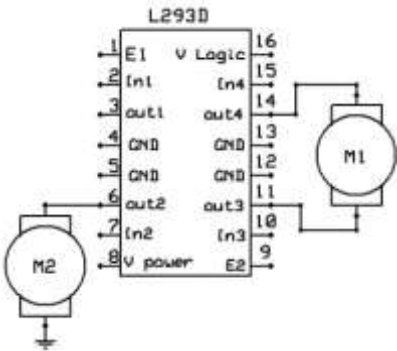
Soil Moisture Sensor

Fig. 3 Soil Moisture Sensor

This sensor can be used to test the moisture of soil, when the soil is having water shortage, the module output is at high level, else the output is at low level. By using this sensor one can automatically water the flower plant, or any other plants requiring automatic watering technique. Module triple output mode, digital output is simple, analog output more accurate, serial output with exact readings.
Features

_____

- Sensitivity adjustable.

- Has fixed bolt hole, convenient installation.

- Threshold level can be configured.

- Module triple output mode, digital output is simple, analog output more accurate, serial output with exact readings.
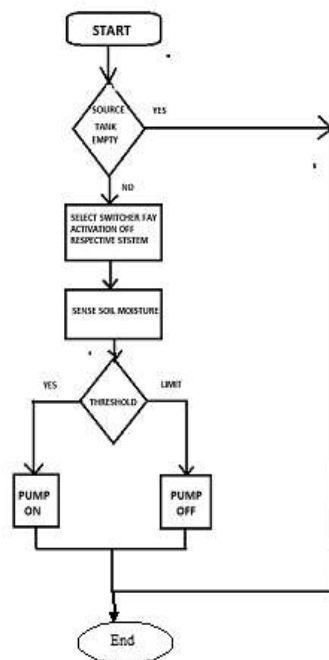
III. METHODOLOGY

Figure 4 Flowchart of proposed system

Steps:

1. On detecting empty water tank buzzer will get On and alert message will be shown on LCD. On getting start, moisture sensor will give the analog data.

2. Input analog signal will be converted to it digital equivalent value.

3. Calibrate digital value with actual moisture level and show it on LCD.

4. Threshold value of moisture level is predefined. When moisture level drops below threshold, watering should be done.

5. On measuring room temperature the system will crosscheck the data with predefined conditions. If it satisfies then water pump gets on.

6. Water pump gets on and off by motor driver L293D.

7. In similar way the system will work for all four sensors.

8. On the other hand float switch will trigger controller if water tank gets empty.

9. On detecting empty water tank buzzer will get on and alert message will be shown on LCD.

IV. RESULTS AND DISCUSSION

Figure 5 Working Model of Automatic Irrigation System

Figure 5 shows the working model of Automatic Irrigation system. Here, it shows the value of moisture content in the soil and compare the current value with predefined threshold value. If current value is less than threshold value then controller will ON the respective motor to provide the water to the crops or plants. Automatic irrigation system is a portable project which can be used anywhere and can be used by anyone. Automatic irrigation system is cost efficient project and reduces manual work. Motors and sensors are working continuously. Arrangements can be made to reduce the cost of irrigation such that it could be afforded by the end-user i.e. farmer for agriculture.

The main purpose of proposed system is used to reduce effort of farmer and saves electricity and water.

V. CONCLUSION

India is a land of agriculture where 2/3 of its population practice farming. Most of the farming in the nation is non-mechanized manual farming which leads to more use of labor force, more errors and more time involved for it.

In order to mechanize agriculture, the proposed system introduced a concept of Automatic Irrigation system which could reduce the efforts taken by farmer in the field and bring more accuracy in watering the plant.

REFERENCES

[1] Zeng Ma, Xing Pan, " Agricultural Environment Information Collection System Based Space On Wireless Space Sensor Network" , IEEE Global High Tech Congress On Electronics ,2012.

[2] Nagraj Patil and Ram Patil, " *Automated Irrigation System On Sensing Dampness Content*" , International journal of innovative research in electronics engineering 2013.

[3] Zhu Yao-Lin Gao-qiang, Zhu Lei, Zu Jin, " Design Of Wireless Multipoint Temperature Transmission System Based On Nrf24l01" , IEEE, 2011.

[4] The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Mazidi, Pearson Publication.

_____